RADIATION AND POLARIZATION MEASUREMENTS DURING THE SOLAR ECLIPSE OF APRIL 8, 1921, AT DAVOS

By C. DORNO

The following note was sent to the Solar Radiation Investigations Section of the Weather Bureau by Doctor Dorno, with the comment that "The interest which was taken in the solar eclipse of the 24th of January, 1925, was so great in the United States that perhaps the hitherto unpublished observations conducted here on that of the 8th of April, 1921, will also be found worth attention." Slight changes have been made in the text, the original figures of course remaining unaltered.

Commencement of the eclipse, $8^h.175$

Maximum obscuration, $9^h.430$

End of the eclipse, $10^h.783$

Maximum obscuration, 0.738 solar diameter, or 0.663 solar area.

Cloudiness, during first half of eclipse 3–4 Fr.–Cu.; later 0.

Radiation.—At the time of maximum obscuration, a decrease was found as follows:

	Per cent
In the total intensity	73. 0
In the intensity of the red rays (measured with Michelson's actinometer in single readings)	70. 8
In the intensity of the ultra-violet (measured with cadmium cell)	77. 4
In the total intensity of sun plus sky (registered with Angström's pyranometer)	66. 8

The decrease and increase occurred unsymmetrically with the chief phase as follows:

In total intensity	decrease slower than increase;
In red intensity	decrease slower than increase;
In ultra-violet intensity	decrease more rapid than increase;
In sun plus sky intensity	decrease more rapid than increase.

The percentage of decrease of radiation is greater than the percentage of obscured surface, for the reason that at the maximum phase a relatively large part of the unobscured solar surface was near the solar margin, and only a small part consisted of the strongly radiating center of the sun's disk. The decrease of brightness from the center to the margin of the solar disk is greater for ultra-violet than for red; therefore, the measurements give a greater decrease of radiation in the ultra-violet than in the red. From the distribution of brightness over the solar disk for wave length 0.644 (red) determined by C. G. Abbot [1] and for ultra-violet, 0.320 (approximate optic center of gravity of cadmium cell) by Schwarzschild and Villiger,[2] a loss of radiation is calculated from the surface obscuration of 74.7 per cent of red, and 81 per cent for ultra-violet, i. e., 3.9 per cent for red and 3.6 per cent for ultra-violet more than found. The diffraction of rays round the edge of the obscuring disk of the moon necessitates a difference in the direction measured, and this must be somewhat greater for red than for ultra-violet, as the diffracted light arises from the marginal zones which are relatively rich in red.

According to the visual observations made, the velocity of travel of the shadow from 25 minutes before until 25 minutes after the maximum appears to have been approximately the same, and the total duration of the increase is about seven minutes longer than that of the decrease. Both these observations are in agreement with the variations in the ultra-violet radiation which, owing to the quartz optical system employed, was exclusively of solar-origin. On the other hand, in conformity with the construction of Michelson's actinometer, the values for the total and red radiation include a zone of the sky which extends to about 5 degrees around the sun; therefore their radiation values exhibit slightly different changes.

Polarization.—The amount of polarization of the zenith undoubtedly increased during the eclipse, as a comparison with the normal spring values belonging to the corresponding solar altitudes proves. The course of the Babinet point is not distinct; during the first half of the eclipse it appeared to approach the sun, while its course during the second half casts doubt upon this conclusion.

Meteorological elements.—Temperatures measured with Assman's aspiration psychrometer distinctly show a fall of the wet bulb as well as of the dry bulb thermometers, which reaches a maximum at the time of maximum eclipse. The relative humidity derived from these temperatures shows no reversion, although an interruption of the normal daily decrease sets in shortly after the maximum eclipse phase. The atmospheric pressure fell slowly and continuously from morning until noon, the total fall amounting to 0.8 mm.

[1] Annals of the Astrophysical Observatory, III, p. 157.

[2] Physikalische Zeitschrift, 1905, p. 742.

SEASONAL PRECIPITATION IN CALIFORNIA AND ITS VARIABILITY

By B. M. VARNEY

PART II

V. MEAN SEASONAL DEPARTURES FROM MEAN SEASONAL RAINFALL IN CALIFORNIA

1. *Selection of stations as a basis for mapping.* The mapping and discussion of the mean seasonal departures have been based on the records of the 82 stations which at the end of the 1919–20 season had 25 seasons of record. The reasons for thus limiting the basis for the treatment of this phase of the subject are three: First, it is preferable to compute departures on the basis of means derived from the actual number of seasonal totals available for the station in question, and not on adjusted means. Second, means based on short periods may not be at all representative of the true conditions. Third, the small number of departures available in the short records make any computation of mean departures from seasonal averages in terms of percentage of those averages highly illusory.

The resulting restriction of the number of records that can justifiably be used leads to unsatisfactory distribution of the stations for mapping purposes. The situation is made clear by reference to Figures 1 (see part 1 of this paper, in REVIEW for April, 1925) and 5, the first of which, together with the alphabetical and numerical lists of stations in Table 3 (in part I of this paper), forms a guide to the stations used, and the second of which shows the distribution of percentage departures for those stations. Points that will be noted in regard to station distribution are: First, the high concentration of stations in the north central part of the State, and the moderate concentration in southern California; second, the very